

TIMOTHY J. SULLIVAN, Ph.D., 4-7-09

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IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his)	
capacity as ATTORNEY GENERAL)	
OF THE STATE OF OKLAHOMA and)	09:03:25
OKLAHOMA SECRETARY OF THE)	09:03:25
ENVIRONMENT C. MILES TOLBERT,))	
in his capacity as the)	
TRUSTEE FOR NATURAL RESOURCES))	
FOR THE STATE OF OKLAHOMA,)	
)	
Plaintiff,)	
)	
vs.)	4:05-CV-00329-TCK-SAJ
)	09:03:25
TYSON FOODS, INC., et al,)	09:03:25
)	
Defendants.)	

VOLUME I VIDEOTAPED DEPOSITION OF TIMOTHY J.	09:03:25
	09:03:25
SULLIVAN, Ph.D., produced as a witness on behalf of	
the Plaintiffs in the above styled and numbered	
cause, taken on the 7th day of April, 2009, in the	
City of Tulsa, County of Tulsa, State of Oklahoma,	
before me, Karla E. Barrow, a Certified Shorthand	09:03:25
Reporter, duly certified under and by virtue of the	09:03:25
laws of the State of Oklahoma.	

09:03:25
09:03:25

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EXHIBIT

2

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1 A I'm not following the question.

2 Q What factors did you look at when identifying
3 lakes that would be impacted by atmospheric nitrogen
4 deposition?

5 A We looked at published material. This 02:18:18
6 document was restricted to a synthesis of published
7 material, so we looked at the extent to which
8 studies had been conducted that had identified lakes
9 as being sensitive in terms of eutrophication to
10 nitrogen inputs, and what kinds of lakes they were 02:18:27
11 and what the conditions were whereby that would be
12 likely to occur.

13 Q Did you do any other analysis besides that, to
14 identify which lakes would be sensitive?

15 A Well, I just relied on the studies that had 02:19:05
16 been published to evaluate the issue. I mean, I
17 didn't try to take lake A and determine if it's
18 nitrogen limited or not.

19 Q Have you ever evaluated the eutrophication
20 status of a particular lake? 02:19:16

21 A I've looked at the nutrient concentrations in
22 a number of lakes, so beyond that, I'm not sure what
23 you mean.

24 Q Well, have you -- have ever done any research
25 or issued any opinions regarding the trophic status 02:19:24

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1 of a particular lake?

2 A I don't think so. Probably not for a lake.

3 Q Have you done any analysis or issued any
4 opinions with regard to the trophic status of a
5 stream?

02:20:07

6 A That National Ambient Air Quality report that
7 I'm talking about, I don't remember if we talked
8 about streams with respect to this issue. I know
9 that at least the major focus for this issue was
10 lakes. There might have been some stream discussion
11 in there, too. I mean, we talked about the nutrient
12 status of streams and most of those watershed
13 assessments, and I think that there is some of them
14 where we looked at N versus P limitation. I know I
15 looked at N versus P limitation in the Tillamook
16 studies, those would be streams. I can't think of
17 any other.

02:20:19

02:21:06

18 Q Have you ever collected any samples of algae
19 in a river or a stream?

20 A A long time ago.

02:21:18

21 Q What was the context of that?

22 A The context of that would have been in an
23 educational arena, I would have collected algae with
24 students. I certainly did that in lakes, and I
25 think I did it in streams. One of the things I used

02:21:28

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1 MR. BOND: Object to the form.

2 Q (By Ms. Burch) Prior to this case?

3 MR. BOND: Same objection.

4 A You mean a legal case?

5 Q (By Ms. Burch) Let me -- I'm going to 03:14:04

6 rephrase the whole thing. Have you ever worked on

7 an investigation of a watershed where land

8 application of poultry waste was a potential source

9 of pollution?

10 MR. BOND: Object to the form. 03:14:11

11 A Well, I think there's a problem with labeling

12 poultry litter as poultry waste. I think a lot of

13 people would consider it to be fertilizer. But I've

14 worked on projects that involved applying fertilizer

15 in the form of manure to pasturelands, but that 03:14:23

16 manure was not poultry manure, it was cattle manure.

17 Q (By Ms. Burch) Have you reviewed the Poultry

18 Feeding Operation Act in Oklahoma?

19 A Which act?

20 Q The Poultry Feeding Operations Act? 03:15:04

21 A The Feeding Operations Act? I don't remember

22 seeing that. It may have crossed my desk, but I

23 don't remember it in any detail.

24 Q Have you reviewed the Arkansas laws that

25 govern management of poultry waste in Arkansas? 03:15:17

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1 A Yes, I've examined the regulations that govern
2 the management of poultry waste in both states.

3 Q Okay. Well, let's clear this up then. Which
4 regulations in Oklahoma did you review?

5 A Well, in Oklahoma, there was regulations early 03:15:28
6 on that had to do with poultry water systems that
7 doesn't really apply, I don't think, in this case.
8 Then there was the regulations that were part of the
9 revised CAFO federal regulations by EPA, and they
10 would apply to designated CAFOs in all of the 03:16:11
11 states, so I looked at that. And then there was
12 also, in Oklahoma, the NRCS Code 590, the Oklahoma
13 version of that, and I looked at that. And I looked
14 at some publications that discussed these various
15 regulations and they're cited in my report, but I 03:16:24
16 can't tell you off the top of my head which
17 publications they were, but they're discussed in the
18 report. So I would say for Oklahoma, that's
19 probably -- that's certainly the main types of
20 regulations that I looked at. 03:17:02

21 Q In the literature regarding regulations in
22 Oklahoma, is that literature regarding the NRCS Code
23 590?

24 A I mentioned that as one of the pieces that I
25 looked at, yes. 03:17:12

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1 Q Do you recall which other regulations may have
2 been discussed in the literature that apply in
3 Oklahoma?

4 A I think that the regulations that were
5 discussed were the Code 590, the Oklahoma version of 03:17:20
6 that, and the EPA CAFO rules, and the earlier
7 regulations didn't apply to litter application, they
8 applied to other aspects of poultry management.
9 Those are the only ones I remember. If you want me
10 to look through the report, I will do that. But 03:17:32
11 whatever I reviewed, as far as I know, is mentioned
12 in that section of the report where I talk about the
13 regulations.

14 Q Is that -- if you will turn to Page 3 of your
15 report. 03:18:23

16 A Page 3?

17 Q Yes. Sort of an index.

18 A Uh-huh.

19 Q And there's No. 19, which says, existing state
20 and federal guidelines and regulations were crafted 03:18:28
21 to minimize the potential for surface water
22 contamination?

23 A Uh-huh.

24 Q Is that the section of your report you're
25 talking about? 03:19:02

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1 A Yes.

2 Q Okay. Let's turn to that. Could you put --
3 could you review that section and tell me if there
4 are any other Oklahoma regulations that you
5 reviewed?

03:19:15

6 A Well, Oklahoma has a P index, but I think
7 that's all mentioned in the Code 590. I mean, if
8 you want me to read the whole thing and try to find
9 out what else is Oklahoma specific, I can certainly
10 do that, but I believe that what's Oklahoma specific
11 is what I have just mentioned.

03:19:27

12 Q If there were any other -- yeah, I would like
13 you to read over it, actually, if you don't mind and
14 see if there are any other state regulations.

15 A State regulations in Oklahoma.

03:20:09

16 Q In Oklahoma.

17 A Okay. Starting on Page 102. I'll try to not
18 read it word for word but just try to skim it.

19 Well, the USDA and EPA joint strategy, I mean that
20 applied to all states so Oklahoma would be part of
21 that, and that's where they talked about the states
22 deciding what phosphorus management tool they would
23 prefer. Most states selected the phosphorus index,
24 so that would apply to Oklahoma, but it wasn't

03:20:25

25 specific to Oklahoma. And we talked about the CAFO.

03:21:03

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1 Again, that applies to all states. This is the
2 regulation for nutrient management plans, and that's
3 required by a couple of different regulations.

4 Q Can you be more specific?

5 A Well, the CAFO regulations require that for 03:21:25
6 operations that are classified as CAFOs. The Code
7 590 requires that. There may be other regulations
8 in Oklahoma that require that, too, I don't know.
9 I'm sorry, but I don't see anything else in here
10 that's Oklahoma specific, so I'm not quite sure what 03:22:29
11 you're asking me to do.

12 Q That's all I wanted to know.

13 A Okay.

14 Q Was there any other regulations that were
15 Oklahoma specific that you had considered. 03:23:05

16 A If I considered them, then they'd be in my
17 considered materials that I submitted. As far as I
18 can tell you sitting here today, the ones that I
19 looked at and included in my report are the ones
20 that I talk about here. If there was another 03:23:12
21 regulation that I looked at and did not put into my
22 report, then I would say that it's considered to the
23 extent that I looked at it and sent it to you as
24 considered material, and then have subsequently
25 forgot about it, that's a possibility, I wouldn't 03:23:20

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1 rule that out. But if I considered it, then I made
2 the effort to give it to you so you would know that
3 I considered it. These are the ones that I got into
4 my hands, as I was writing the report and from which
5 I wrote the report, and if there is a rule or rules 03:23:28
6 that is not in here, then that might have been an
7 oversight, but I'm not aware of one.

8 Q The CAFO rule that you make reference to --
9 actually, the CAFO regulations you make reference to
10 on Page 102? 03:24:10

11 A Uh-huh.

12 Q Do those regulations apply to any poultry
13 operations in the Illinois River watershed?

14 A I don't know the answer to that. They
15 automatically apply if the operations are above a 03:24:18
16 certain size, and they -- the state agency that has
17 responsibility for CAFO oversight can designate as a
18 CAFO any animal feeding operation that it deems fit
19 to designate. If there's concern that that
20 operation may contribute to contributions to 03:24:28
21 phosphorus or other constituents to the stream, then
22 the state agency has the option to designate that
23 operation as a CAFO. But a certain number of
24 birds -- depending on what type of birds that number
25 changes, a certain number of birds will trigger an 03:25:07

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1 automatic classification of the poultry operation as
2 a CAFO.

3 Q What agency in Oklahoma has the authority to
4 designate CAFOs?

5 A I'm not sure if it's agriculture and forestry 03:25:16
6 or it's one of the other environmental agencies, but
7 each state has an agency that's designated as the
8 authority over those, and I'm not sure which one it
9 is in Oklahoma.

10 Q Do you know in Arkansas which agency it is? 03:25:23

11 A No, I'm not sure.

12 Q What regulations apply to poultry operations
13 in Arkansas?

14 A Okay. Arkansas uses a P index -- no, let me
15 just look through this like we did for Oklahoma. In 03:26:08
16 Arkansas, we would have the same federal regulations
17 that I've discussed for Oklahoma.

18 Q And that includes the CAFO regulations and
19 NRCS Code 590; correct?

20 A The Code 590 would be applicable. That joint 03:27:01
21 agreement between NRCS and EPA with respect to
22 nutrient management plans would be applicable. This
23 is the Arkansas Nutrient Management Planner's Guide
24 that provides an overview of mutual planning of
25 requirements in Arkansas, and it talks about various 03:27:15

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1 regulations. There's the Arkansas State Regulation
2 5, that's the one that requires -- that has
3 requirements with respect to liquid manure handling
4 systems, but that's not dry poultry litter
5 application, that's a different kind of an 03:27:26
6 infrastructure. And then the Arkansas Acts 1059 and
7 1061 that identify nutrient sensitive areas, and
8 they require nutrient management plans for the state
9 and litter management plans for poultry operations
10 of above a certain size. And use of the P index to 03:28:05
11 determine the manure application rate that's
12 allowable, and then there are setback distances that
13 are referenced to other NRCS regulations. The 633
14 waste management and the 393 filter strips
15 requirements that specify distance, setback 03:28:16
16 distances. And as I said, the 590, NRCS Code 590.
17 So again, I think that's -- I think that's all that
18 I discussed. If there are any other regulations
19 that I missed, then I missed them. I'm not aware of
20 any. 03:29:02

21 Q Do you know when the Arkansas Acts 1059 and
22 1061 were passed in Arkansas?

23 A I think I do, but I'm not positive.

24 Q When do you think they were passed?

25 A I think they were passed in about 2003, to 03:29:10

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1 take effect in about 2006, but I'm not positive of
2 that, of either one of those dates.

3 Q Prior to the effective date of those acts,
4 were there any other acts that aren't mentioned in
5 your report that applied to poultry operations in 03:29:23
6 Arkansas?

7 MR. BOND: Object to the form.

8 A I'm not sure because that really wasn't the
9 focus of what I was looking for. My concern here is
10 what are the applicable regulations, what -- under 03:29:29
11 what regulations would poultry litter be applied.
12 It was not part of my investigation to determine
13 what were the applicable regulations at some time in
14 the past, that really wasn't part of what I was
15 trying to determine. So I didn't set out to look 03:30:08
16 for those, so I make no -- you know, no claim that
17 they are in here or they should have been in here
18 because I wasn't looking for them.

19 Q (By Ms. Burch) From looking on Page 105 of
20 your report, it looks like there are several -- and 03:30:18
21 it continues on over to Page 106, but there are
22 several sources of regulations that apply in
23 Arkansas that are listed there; correct?

24 A I think these are the ones that I just went
25 over a few minutes ago. 03:30:32

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1 MR. BOND: You mean all of Arkansas?

2 MS. BURCH: I'm speaking about the
3 Illinois River --

4 MR. BOND: Okay.

5 MS. BURCH: -- watershed? 03:32:08

6 A I don't know how many operations were
7 automatically classified as CAFOs under the new EPA
8 rules based on -- like for chickens it's 125,000, I
9 think, and then maybe 65,000 turkeys. For different
10 birds there are different cutoffs by which an 03:32:19

11 operation is automatically classified as CAFO. But
12 again, the state has the flexibility that they can
13 take a smaller operation and say, we think that
14 there's the potential for contribution of phosphorus
15 or some other constituent to stream water, and, 03:32:26

16 therefore, we're going to classify you as a CAFO,
17 even though you have a smaller operation than what
18 would cause you to be automatically classified. I
19 have no idea whether Arkansas has taken such a step
20 or how many of the operations in Arkansas may be 03:33:03
21 automatically defined as CAFOs.

22 Q (By Ms. Burch) So for poultry operations
23 which don't have liquid manure handling systems and
24 aren't classified as CAFOs, what requirements were
25 in place prior to 2006 in Arkansas that would 03:33:20

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1 require a nutrient management plan and application
2 in accordance with the phosphorus index?

3 MR. BOND: Object to the form.

4 A As I mentioned a few minutes ago, that's not
5 something I investigated. I didn't consider it 03:33:28
6 important to decide under what regulations were
7 farmers operating at any time in the past. I wanted
8 to know what the regulations were that were
9 applicable now. That was my focus. So I don't know
10 the answer. 03:34:06

11 MR. BOND: You're not allowed to go back
12 and start at the beginning.

13 MS. BURCH: No comments from the gallery.

14 Q (By Ms. Burch) All right.

15 A Let me just add something there. I think I 03:34:23
16 need to -- for me to fully, you know, respond to
17 that question, I would need to know what the dates
18 were of these other NRCS standards and the 1059 and
19 1061. This is my understanding from what was
20 available to me of what's -- you know, of what's 03:35:01
21 currently applicable, but the exact dates for which
22 these various things were implemented, I really
23 didn't try to determine that. I picked up in my
24 reading somewhere the 2003 and 2006 dates that I
25 gave you before that may -- I think are accurate, 03:35:11

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IN THE UNITED STATES DISTRICT COURT FOR THE
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08:43:24
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1 the Water Resources Board data?

2 A Figure 2-13 is Water Resources Board, E. coli.

3 Q And were those three figures combined on any
4 figure in your report?

5 A Let's see. E. coli. I see E. coli from three 09:31:26
6 data sources on Figure 2-17.

7 Q And that -- I just want to make it clear. Is
8 that combining the analysis from 2-11 through -- let
9 me make sure, 2-11, 2-12 and 2-13?

10 A That would be combining the data in 2-11, 09:32:13
11 2-12, and 2-13, yes.

12 Q Looking at Figure 2-17, it appears to me there
13 are a number of exceedances of the E. coli standard
14 throughout the Illinois River watershed. Is that
15 the way you interpret this? 09:32:32

16 A You're asking about 2-17?

17 Q Yes.

18 A There are a number of sites on Figure 2-17
19 inside the IRW that had the geomean of the five
20 samples during that time period that were colored as 09:33:09
21 orange, indicating that they were above the geomean
22 standard.

23 Q Based on this analysis that you did, do you
24 see widespread violations of the E. coli standard in
25 Oklahoma? 09:33:19

1 A No, no, these data would not allow me to
2 determine that.

3 Q Why is that?

4 A Because to determine if there's a violation of
5 the standard, that's where you're required to 09:33:25
6 analyze samples collected within a 30 day period,
7 and that restriction was not placed on this because
8 it's a spatial analysis for the state, as we
9 discussed before.

10 Q Were you able to do that for the bio -- for 09:34:03
11 the bars that are located within the Illinois River
12 watershed?

13 MR. BOND: Object to the form.

14 A I don't understand the question.

15 Q (By Ms. Burch) Were you able to calculate 30 09:34:09
16 day geometric means based on five samples during a
17 30 day period for the bars located within the
18 Illinois River watershed?

19 A I didn't attempt to do that, but my impression
20 is from discussing the quantity of data that we had 09:34:15
21 with Todd, that there would be so few data points
22 anywhere in Oklahoma, that that was not a spatial
23 analysis that would be very helpful for the purpose
24 of doing what I set out to do here and what we've
25 already discussed. It was not the intention to try 09:34:23

1 A I did something like this for Watts, and I
2 presented that, I believe, in the preliminary
3 injunction hearing. I think it would just be Watts
4 and Tahlequah would be the only places.

5 Q Did you use the same 70th percentile cutoff 10:21:20
6 value for high flow at Watts?

7 A Yes.

8 Q Would you turn to Figure 10-2?

9 A Yes.

10 Q It looks like these are E. coli geomeans by 10:21:32
11 year and fecal coliform geomeans by year looking at
12 USGS data at Tahlequah; is that correct?

13 A Correct.

14 Q Now, this data does not analyze the Water
15 Resources Board, the STORET or the State's data; is 10:22:15
16 that correct?

17 A That's correct.

18 Q When this -- when you do this analysis, are
19 there a number of violations of the geometric mean
20 standard identified for E. coli and fecal coliform? 10:22:25

21 MR. BOND: Object to the form.

22 A No, based, as we've discussed a number of
23 times here, that a violation of a standard is based
24 on five or more samples collected over a 30 day
25 period. This was not an attempt to evaluate whether 10:23:04

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1 or not any standard was violated, this was an
2 attempt to evaluate the patterns and the data.

3 Q (By Ms. Burch) Just so I understand, looking
4 at the -- would I call this a figure or a graph?

5 A Either one is correct. 10:23:14

6 Q Looking at the figure for E. coli geomeans, it
7 looks like there's a dot right above 2000 and it has
8 the number 11 above it?

9 A Yes.

10 Q And there's a dot beside it that has the 10:23:22
11 number 12 above it?

12 A Correct.

13 Q Going back to the dot with 11, is that a
14 geomean calculation using 11 samples collected
15 during the year 2000? 10:23:28

16 A Yes.

17 Q And the same would be true of the other dots,
18 then, that they are collected during the year, and a
19 geomean calculated based on all of the samples
20 collected during that year? 10:24:07

21 A The number of samples for each data point, for
22 each dot, is indicated above the dot. I tell how
23 many samples under the calculations, so I didn't
24 exclude any data on this graph. I showed all the
25 USGS data that were collected at Tahlequah by year, 10:24:14

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1 A Uh-huh.

2 Q To a stream in a rainfall event or even to yet
3 another location?

4 MR. BOND: Object to the form.

5 A Well, that's going to depend, because if you 11:27:13
6 start at point A and there is overland flow and it
7 moves to point B, and then you have another storm
8 come along, will it move from point B to the stream,
9 which we'll call point C, and that's going to depend
10 on a whole bunch of things. We talked about a lot 11:27:20
11 of this yesterday with respect to the things that
12 are associated with overland flow. So if the
13 topography and the landscape factors and the cover
14 and all the other things that mattered that we've
15 talked about before, if those are different between 11:27:26
16 B and C such that overland flow would not be
17 contributed by that storm, then no, it wouldn't.
18 But if the conditions were such that overland flow
19 would be -- would allow movement from B to C, then
20 perhaps it could. I have no -- I really have no way 11:28:06
21 to know. It's a site specific kind of an issue.
22 You can't make general conclusions about whether or
23 not that would happen.

24 Q Are there areas within the Illinois River
25 watershed which have application of phosphorus to 11:28:16

1 the soil which never generate runoff of phosphorus?

2 A I can't tell you that. I can't answer that.

3 What I can say is that phosphorus in poultry litter,

4 according to the rules that are in effect, is not

5 placed in areas that would generate -- or be 11:29:02

6 expected to generate an appreciable amount of

7 overland flow. That's the reason that those areas

8 are selected and the farmers are instructed to not

9 apply phosphorus to those areas, and that's the

10 reason why they will use things like phosphorus 11:29:11

11 indices to try to decide the relative risk of

12 phosphorus transport to avoid -- to avoid those

13 areas.

14 Q And my question was more general than poultry

15 waste, and the question was, if phosphorus in the 11:29:18

16 form of animal waste or fertilizer or biosolids,

17 whatever the source, is applied to the surface of

18 the lands in the Illinois River watershed --

19 A Uh-huh.

20 Q -- are there some locations within the 11:29:26

21 Illinois River watershed where that phosphorus will

22 be -- remain forever and not be transported via

23 runoff or infiltration?

24 MR. BOND: Object to the form.

25 A I'm not sure. We've discussed this before, 11:30:04

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1 you know, the remain forever part. Being absolute
2 with things is not really something that
3 environmental science does, so I can't tell that you
4 there are places where phosphorus is going to remain
5 forever. I can't tell you that it's possible that 11:30:13
6 there would be places that phosphorus would not
7 remain forever. That's not really something that I
8 can do with the information and the tools available
9 to me.

10 What I can do is to give you an indication 11:30:21
11 of what's the relative likelihood of that movement,
12 and that's what -- that's what the litter management
13 approaches attempt to do in the case of litter. In
14 the case of cattle, there are no regulations of
15 which I'm aware that -- yet that attempt to do that 11:30:29
16 and to regulate where that phosphorus and other
17 things might be applied. There are regulations with
18 respect to septic systems, and in many cases the
19 septic systems are old and they were not installed
20 under those regulations. 11:31:07

21 Q (By Ms. Burch) The -- in the event that there
22 is a place where you can land apply phosphorus and
23 it is not going to run off, are there places like
24 that in the Illinois River watershed?

25 MR. BOND: Object to the form, asked and 11:31:16

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1 answered.

2 A There are places in the Illinois River
3 watershed where one would not expect that there
4 would be appreciable movement of phosphorus from
5 that area to another area or, in particular, to a 11:31:22
6 nearby stream. That's probably the majority of the
7 land area, but I've not conducted analyses to try to
8 determine that it's the majority of the land area,
9 but that would be my general sense, that there are
10 certain areas that have conditions such that one 11:32:03
11 would expect that the opportunity for phosphorus to
12 move is probably there, at least some portions of
13 it, and that there would be an increased risk of
14 phosphorus movement under storm conditions
15 typically. And so there are conditions that are 11:32:11
16 reasonably well understood and defined where you
17 expect to find those areas, and then the other areas
18 you expect to not find that situation.

19 Q (By Ms. Burch) And, you know, I just want to
20 make sure I understand. Is the answer yes, there 11:32:21
21 are areas where within the Illinois River watershed
22 that phosphorus will not be released in runoff?

23 MR. BOND: Object.

24 A I've not tried to determine if there are areas
25 like that, and if so, where they are. What I can 11:32:29

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1 tell you is that, in general, there are certain
2 types of areas where you would expect that there's a
3 high risk or high possibility of phosphorus movement
4 to occur under storm conditions, and there are other
5 areas where you do not expect that there's a high 11:33:07
6 risk and an increased possibility of phosphorus
7 movement like that to occur, so that's clear. But
8 to say that it's impossible? Well, my response is
9 in environmental science, it's impossible for me to
10 say that it's impossible because the science doesn't 11:33:16
11 really allow me to do that.

12 Q (By Ms. Burch) And I have the same question
13 in regard to fecal bacteria. Are there locations
14 within the Illinois River watershed where fecal
15 bacteria would not be released during runoff events 11:33:24
16 if it is present on the surface of the land?

17 A My opinion is is that the situation would be
18 similar to phosphorus because it's largely the same
19 process that would mainly be expected to be
20 responsible for movement of fecal indicator bacteria 11:34:06
21 from a land setting to a stream. It's largely an
22 overland flow kind of an issue. As water
23 infiltrates through soil and if it moves laterally
24 through soil, this substantial opportunity,
25 depending on the soil type, but for the soil types 11:34:16

1 may end up in the stream. But if it's not overland
2 flow but rather is infiltration and base flow kinds
3 of flow paths, then it's unlikely that the bacteria
4 would move into a stream, but the tools don't allow
5 me to say that something is impossible.

11:37:32

6 Q Have you ever reviewed any research that was
7 conducted in the Illinois River watershed related to
8 the likelihood of overland flow or infiltration
9 given the soil types in the watershed?

10 A That would have been part of some of these
11 studies that focused on phosphorus indices. I don't
12 think I can point you to a particular study, but I'm
13 not saying that there isn't one out there. There
14 may very well be something out there that certainly
15 touches on that. I'm not aware of any kind of a
16 definitive study.

11:38:09

17 Q Do you know whether any critical source areas
18 have been identified in the Illinois River
19 watershed?

20 A Well, I would -- I don't know if within the
21 context of doing the -- of conducting the phosphorus
22 index calculations in conjunction with the nutrient
23 management plans, that the people actually label
24 them as such, but that -- that knowledge or that
25 understanding of how systems work is embedded in

11:38:28

11:39:11

1 went into designing the phosphorus index and Code
2 590 was based on analysis of the potential for
3 transported bacteria?

4 A I'm not aware that that's been the case.

5 Q Did you review any standards for land 11:42:26
6 application of poultry waste in Arkansas that were
7 designed to manage bacteria and the potential for
8 bacteria runoff?

9 A Well, again, I didn't look at any with that
10 question in mind, but I'm not aware that that has 11:43:09
11 been the case.

12 Q Is it your opinion that the phosphorus index
13 is designed to prevent all runoff of phosphorus from
14 fields?

15 A The phosphorus index is designed to help to 11:43:19
16 identify the areas with an increased likelihood of
17 phosphorus movement that potentially could enter a
18 stream. That's what they're designed to do. To
19 identify the areas where there was an increased
20 likelihood so that those areas could be managed 11:43:29
21 differently to mitigate the possibility of that
22 occurring.

23 Q And I don't know if you can give me a yes or
24 no answer, but do you know -- is it your
25 understanding that they were designed to prevent any 11:44:06

1 release of phosphorus in runoff from pastures?

2 A It's my understanding that they were designed
3 to identify the areas where the risk of that
4 occurring was sufficiently high that they felt that
5 steps should be taken in farm management to prevent
6 or reduce the possibility of that occurring. That's
7 the way it was structured.

11:44:16

8 Q So prevent the possibility of phosphorus being
9 released?

10 A That was the intention, that they would -- on
11 the areas where it was judged that there was a
12 higher risk of phosphorus transport that could
13 potentially enter a stream, that management
14 practices would be altered such as they would
15 prevent or reduce the possibility of movement of
16 phosphorus. That's my understanding of the intent
17 behind the phosphorus indices.

11:44:23

11:45:03

18 Q And where did you -- what do you base that
19 understanding on?

20 A On what I've read about the phosphorus indices
21 is that they're intended to manage the potential for
22 phosphorus transport. So the intention is to
23 eliminate it or reduce it. I mean, you identify the
24 areas where you think it's most likely to occur, and
25 then you change the management so that opportunity

11:45:12

11:45:19

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1 stream, molecules of phosphorus in any stream is
2 enormous.

3 Q Are you -- are you aware of any research which
4 quantifies the amount of phosphorus that would be
5 released from a field if the phosphorus index is 11:47:20
6 applied to that field?

7 A I'm sorry, say that one more time.

8 Q Are you aware of any research that quantifies
9 the amount of phosphorus that would be released from
10 a field if the phosphorus index is applied to that 11:47:28
11 field?

12 A I don't think so. I can't think of any.

13 Q Are you aware of any research which quantifies
14 the amount of phosphorus that would be released from
15 a field if NRCS Code 590 is applied to the field? 11:48:05

16 A I'm not aware of any research that would
17 indicate what the result would be if Code 590 was
18 applied to the field. The presumption is that Code
19 590 was designed with current scientific
20 understanding as its foundation, and that it would 11:48:18
21 therefore --

22 VOICE ON PHONE: Please excuse the
23 interruption. This is AT&T Teleconference verifying
24 that your conference is still active?

25 MR. BOND: Oh, it's still active. 11:48:23

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1 A On the effectiveness of Code 590?

2 Q Yes.

3 A I don't believe so.

4 Q Did you review any research on the
5 effectiveness of the phosphorus index particular to 11:51:28
6 the Illinois River watershed?

7 A There have been studies of the effectiveness
8 of the phosphorus index in identifying areas of
9 enhanced opportunity for phosphorus transport. I
10 don't remember if any of those were inside the IRW 11:52:09
11 or not, but there have been some studies that looked
12 at the effectiveness of the phosphorus index, yes,
13 and they will be in my considered materials.

14 Q Did any of those find that the application of
15 the phosphorus index was effective at eliminating 11:52:18
16 phosphorus in runoff?

17 A I seriously doubt any of those studies would
18 have been constructed to try to do that, and I don't
19 think that's possible to design a study that would
20 indicate that it would be possible or impossible. 11:52:27

21 Q Did any of those -- any of that research
22 indicate that the phosphorus index, as applied on a
23 particular field, was ineffective at preventing the
24 runoff of phosphorus?

25 A Not that I'm aware of. 11:53:05

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1 Q Would a substantial amount be retained?

2 A I'm not aware of what the research foundation
3 is for that regulation, so I would have to look at
4 the specific studies on which they based the
5 regulation. And again, they based it on something, 12:04:07
6 and I don't know specifically what it was. I've
7 seen no data to indicate to me that the regulation,
8 as it's formulated, is ineffective. I have no
9 reason to believe that.

10 Q Now, let's talk about bacteria. And then 12:04:15
11 is -- I think that the question I was asking
12 originally was if bacteria is applied to the surface
13 of the lands in the Illinois River watershed, is
14 infiltration to the groundwater a possibility?

15 A That's back to that same issue of is it 12:04:28
16 possible, will it always happen, will it never
17 happen. Environmental science doesn't take us
18 there. What we know is that the possibility of that
19 occurring becomes diminished, and that's the reason
20 for the regulations is to reduce or eliminate the 12:05:09
21 possibility of that occurring, but we can never say
22 that there's zero movement. We can never say that
23 in environmental science.

24 Q But my question is about bacteria. Is it your
25 testimony that the purpose of Code 590 in the 12:05:17

1 phosphorus index is to eliminate or minimize the
2 possibility that bacteria would be transported to
3 groundwater?

4 A No, I misspoke. I apologize for that. That
5 was designed based on the movement of phosphorus. 12:05:23

6 In some ways, the movement of bacteria is similar in
7 that bacteria tend to adsorb to soils. A major
8 difference in bacteria is that over a period of time
9 they will die, where phosphorus doesn't die. So the
10 scientific principles are similar, with the 12:06:02

11 exception of the mortality component. So I would
12 expect that if we're being protective of phosphorus
13 movement, that there's a pretty good chance we'll be
14 protective of fecal indicator bacteria movement, as
15 well, and I'm not aware of research that would help 12:06:10
16 me to go very much beyond that.

17 Q Have you -- I think you may have just answered
18 this, but I just want to clarify. Have you reviewed
19 any research specific to the Illinois River
20 watershed that talks about its susceptibility in 12:06:21
21 terms of groundwater pollution from land applied
22 waste?

23 A Dr. Steven Larson prepared a report for the
24 defendants that evaluated these issues of the
25 possibility of contamination of groundwater 12:06:32

1 are mixed together across the landscape.

2 Q What was the purpose of the regression
3 analysis that you did?

4 A The purpose of the regression analysis was to
5 address some opinions put forth by Dr. Engel and Dr. 01:21:25
6 Stevenson regarding the empirical relationships that
7 they developed between total phosphorus in stream
8 water, and there were other parameters, as well, but
9 the main one that they were discussing was
10 phosphorus, and poultry house density, as determined 01:22:06
11 from total poultry house counts by the plaintiff.

12 So my analysis was intended to evaluate the extent
13 to which their conclusions were justified and their
14 analysis was appropriate. And so I conducted a
15 number of analyses to examine that issue, and those 01:22:16
16 regression analyses, that was one part of it.

17 Q Did you undertake to calculate the amount of
18 waste generated by the poultry industry in the
19 Illinois River watershed?

20 MR. BOND: Object to the form. 01:22:26

21 A Well, again, I'm focused on poultry litter,
22 which, in my opinion, is typically used as a
23 fertilizer. But if we're talking about poultry
24 litter, I did not conduct analyses to try to
25 quantify how much poultry litter is generated. That 01:23:07

1 was done by Dr. Billy Clay, so he would have been
2 the one -- the expert on our team who was focused on
3 those kinds of issues.

4 Q Did you -- just so we're clear, when you say
5 poultry litter, do you mean the bedding material 01:23:20
6 that's soiled by poultry inside the poultry houses?

7 MR. BOND: Object to the form.

8 A What I mean is what is being collected from
9 the poultry barns, transported to the pasturelands
10 and spread on the pasturelands. 01:23:29

11 Q (By Ms. Burch) Did you undertake to identify
12 the areas within the watershed where, what I call
13 poultry waste is land applied in the Illinois River
14 watershed?

15 A Did I attempt to identify where they are? 01:24:07

16 Q Yes.

17 A No, I did not.

18 Q Do you know whether soil test phosphorus
19 levels are elevated in the Illinois River watershed?

20 A What do you mean by elevated? 01:24:14

21 Q Do you know whether that's a term that's
22 commonly used by people that investigate soil test
23 phosphorus levels in agricultural watersheds?

24 A Well, a lot of people use the term elevated
25 all the time, and they may very well in that 01:24:24

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1 context, I'm not sure, but it's such a subjective
2 term that I'm not sure that it's very revealing when
3 we're talking about details in a legal case. It's a
4 rather subjective work. So I can probably do a
5 better job of answering the question if we can be
6 more specific about what's meant by the term
7 elevated.

01:25:05

8 Q Okay. Do you know whether soil test
9 phosphorus levels in the Illinois River watershed
10 are often above 300?

01:25:11

11 A I know that the -- in Oklahoma, the Code 590,
12 and I believe one of the other State regulations, as
13 well, specifies that if STP is above 300, that
14 litter should not be applied there. That's my
15 understanding of that regulation, yes. And to what
16 percent of the soils that have been tested may be
17 above 300, I really don't know.

01:25:23

18 Q Do you know if there are soils in the Illinois
19 River watershed that are higher than 300?

20 MR. BOND: Object to form.

01:26:03

21 A It's really not something that I looked at.
22 There are experts on the team for the defendants who
23 have examined those kinds of issues. I would say
24 probably Dr. Frank Coale and perhaps Dr. Billy Clay,
25 they would be the ones I can think of who would

01:26:11

1 focus their research and their attention on those
2 kinds of questions. That's not really something
3 that I tried to take on.

4 Q Just so we're clear, do you have any knowledge
5 of whether there are soils associated with pastures 01:26:22
6 in the Illinois River watershed that are in excess
7 of 300?

8 A Well, I know that I read that from some of the
9 State -- the State's expert reports, I know that I
10 read that. I didn't look for information to try to 01:27:01
11 confirm or refute it, and I don't remember if
12 there's information in the Clay or Coale reports to
13 confirm or refute it, so it's really out of my area
14 of expertise and it's really a question for one of
15 the experts who focuses on that. 01:27:11

16 Q Does soil test phosphorus affect the potential
17 for runoff from pastures?

18 A Well, soil test phosphorus is a measurement
19 that's used to evaluate its source term. We've
20 talked a fair amount today about the fact that 01:27:19
21 you've got a source term and you've got a runoff
22 potential term, and it's the overlap of those two
23 that comprise the critical area. So soil test
24 phosphorus is one component of the source term.
25 Another component would be fertilizer or litter or 01:27:27

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1 that there is a 300 STP cutoff limit which if your
2 soil test phosphorus is above 300, no further land
3 application is allowed?

4 A Well, once again, when you're talking about
5 the STP components, you're in the realm of the 01:31:10
6 agronomist, so probably Dr. Coale is the one to talk
7 to about this, but it's my understanding that part
8 of the regulation set in Oklahoma is if STP is above
9 300, that becomes a no spread area. And in
10 addition, what the level of STP is is one component 01:31:20
11 among many that is evaluated in conjunction with
12 applying a phosphorus index to evaluate the relative
13 risk of P movement from field to stream. And if
14 that risk is judged to be relatively high, then
15 litter is not allowed to be spread. If it's judged 01:31:32
16 to be moderate, then it changes the way that the
17 amount of fertilizer required is determined, and it
18 switches in between a phosphorus based estimate and
19 a nitrogen based estimate. And so how that -- how
20 that is structured, it depends on the value that's 01:32:12
21 calculated for the P index, but again, these kind of
22 details are the purview of an agronomist, not me.
23 Q I am just -- do you know whether that 300
24 limit is applied to pastures which are not in
25 hydrologically active areas, as you defined them? 01:32:25

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1 A I don't know.

2 Q Do you have any basis to believe that that 300
3 STP limit is restricted to any subparts of the
4 watershed in the Illinois River?

5 A I don't know anything about that. 01:33:12

6 Q Do you know whether there's an upper limit
7 equivalent to the 300 STP value in the State of
8 Arkansas?

9 A I don't know.

10 Q Do you think that that's an important 01:33:17
11 component of the analysis, an upper limit --

12 MR. BOND: Object to the form.

13 Q (By Ms. Burch) -- on STP?

14 MR. BOND: Same objection.

15 A I don't think it is because, like for example, 01:33:27
16 if you're using a phosphorus index, then that
17 phosphorus index is going to include consideration
18 of the STP information, at least this is my

19 understanding of it, it's going to include that as
20 one component of determining the risk of movement of 01:34:06

21 P from field to stream. So whether or not you
22 impose a rigid cutoff value or you just evaluate the
23 STP number that you have in conjunction with all the
24 other pieces of information that go into the index
25 to determine risk, I don't think that it really 01:34:16

1 A Did I?

2 Q Yes.

3 A I looked at -- I didn't do a lot with Lake
4 Tenkiller. I looked at phosphorus concentrations in
5 Lake Tenkiller relative to a survey of reservoirs in 03:32:20
6 Missouri, and I looked at data from Doctors Cooke
7 and Welch, from their expert report for the State in
8 this case with respect to potential changes in total
9 phosphorus concentrations in Lake Tenkiller over
10 time, and how they may be related or not related to 03:32:32
11 the changes in the amount of stream flow that we
12 just discussed as being important a few minutes ago,
13 so I looked at those. I don't remember any other
14 issues I looked at with respect to Tenkiller. That
15 was mainly -- Tenkiller was mainly covered by 03:33:08
16 defendants' experts Horne and Conley.

17 Q Is your analysis of the Lake Tenkiller data
18 that you did look at on Page 35 of your report? I
19 don't think it is. It's not. It's not. I'll give
20 you a better cite. Let's try Page 91 of your 03:33:26
21 report.

22 A Okay.

23 Q Is that at least where the analysis of the
24 Lake Tenkiller data begins in your report?

25 A I think it is. Let's see, I think it begins 03:34:19

1 at the top of Page 91. I mean, I'd have to look
2 carefully to see if there was some discussions
3 somewhere else, but I don't think that there is.

4 Q That's fine. In the first full paragraph of
5 that report, you indicate that you are analyzing the 03:35:02
6 concentrations of total P at the lacustrine lake
7 like sampling stations, Lake 1 and Lake 2 in Lake
8 Tenkiller; is that correct?

9 A I certainly discussed those, yes, but I think
10 that the figure actually shows Lake 1. But yes, I 03:35:12
11 discussed the two that are identified by the State,
12 and properly so, as lacustrine or Lake 1 and Lake 2.

13 Q Okay. Did you present your analysis of the
14 total phosphorus data for Lake 2?

15 A I don't think I showed Lake 2 anywhere. No, I 03:35:23
16 focused on Lake 1.

17 Q Did you do an analysis of the phosphorus
18 concentrations in Lake 2?

19 A No.

20 Q Why not? 03:35:32

21 A Well, the Lake 1 sample is a sample at the
22 site that's identified as the site closest to the
23 dam that's in a reservoir, that's typically the
24 deepest location in the reservoir. When lakes and
25 reservoirs -- a reservoir is actually a type of a 03:36:11

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1 lake, but lakes are characterized with respect to
2 the water chemistry, that the site that's generally
3 selected with which to characterize the lake is the
4 deepest site, and in reservoirs, that tends to be
5 quite close to the dam. And that's why in the 03:36:19
6 Missouri study that I include on that figure, that's
7 the way that study was conducted, it's all one site
8 close to the dam where we're comparing apples with
9 apples. When the EPA conducts lake surveys like the
10 National Lake Survey from 2007 or the environmental 03:36:28
11 monitoring assessment program lake surveys that have
12 been going on since the early '90's, when the EPA or
13 even the National Rain -- the U.S. National Rain
14 Program, the lake survey that was conducted in
15 that -- actually there were two of them, the eastern 03:37:09
16 and the western lake surveys in the '80's, all of
17 those are done based on one sample and what is
18 determined to be the likely deepest part of the
19 lake, that's usually how it's done. It doesn't mean
20 that other locations are not also relevant, they 03:37:17
21 are, but if you want to characterize a lake, you
22 want to pick a site to characterize the lake, you
23 pick the deepest site and reservoir that's closest
24 to the dam, so that's why I chose Lake 1. I could
25 have done an analysis on Lake 2, but that's why I 03:37:24

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1 chose Lake 1.

2 Q Did you do an analysis on Lake 3 or Lake 4?

3 A No. I looked at data on Lake 3 and 4 and

4 Cooke and Welch, but I did not do analysis on Lakes

5 3 and 4. 03:38:02

6 Q Do you know how the State of Oklahoma requires

7 lakes to be analyzed for water quality?

8 A No.

9 Q Do you know how the State of Oklahoma

10 typically evaluates water quality in lakes with 03:38:12

11 reference to sampling locations?

12 A No.

13 Q Number of samples?

14 A I don't know what the State of Oklahoma

15 generally does with regard to that, no. I mean, 03:38:17

16 I've seen data from lakes from Oklahoma, for

17 example, I think some of that might have been in --

18 well, maybe not. Maybe I haven't. I'm not sure.

19 Q Do you think that the sampling data at Lake 4

20 would represent accurately the water quality 03:38:29

21 conditions at, say, Lake 2?

22 A No. No, they are very, very different.

23 Q And I assume your answer would be the same

24 with regard to Lake 3 and Lake 4?

25 A The sites are chosen because they're intended 03:39:12

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1 I would never use a Lake 2 type sample, a
2 transitional zone sample to evaluate what's going on
3 in a lake. What represents the lake is the water in
4 the deep areas where the main body of the lake
5 occurs, not up at the top end where the rivers are 03:42:26
6 flowing in. I mean, that's part of the lake and
7 people may want to look at that for a variety of
8 reasons, but what characterizes the lake is the
9 water quality in the main body of the lake where the
10 water is deep, and that's why EPA says sample in the 03:43:04
11 deepest part of the lake for their surveys, and
12 that's why the Missouri reservoir study was
13 conducted that way. So that's what I focus on. But
14 if you want to see the same kind of a presentation
15 for Lake 2, that is present in the Cooke and Welch 03:43:13
16 report and I looked at it, I don't remember exactly
17 what the pattern was, but it's there.

18 Q Okay. So do you have an opinion on whether
19 conditions at the Lake 2 site are better or worse
20 than they were historically? 03:43:23

21 MR. BOND: Object to form.

22 A No, I don't have an opinion. That's not -- I
23 didn't think that the Lake 2 site was particularly
24 relevant to what my interest was here. Again, I saw
25 it in the report, but I don't remember -- I don't 03:43:29

1 remember what it looked like. It was not of a great
2 deal of interest to me for the purposes of my
3 analyses.

4 Q (By Ms. Burch) And do you have an opinion as
5 to whether conditions in the areas represented by 03:44:06
6 the Lake 3 and 4 sites have become better or worse
7 over time in terms of total phosphorus?

8 A Excuse me a minute. Can I back up? I may
9 have misspoken. When I was talking about
10 transitional, I was talking about Lake 3. Did I 03:44:14
11 call it Lake 2.

12 Q My question was about Lake 2.

13 A I'm sorry, then I misspoke. I apologize for
14 that. Lake 2 is another lacustrine site, so Lake 2
15 would be more likely -- I'm really sorry that I did 03:44:22
16 that to you. It would be more like Lake 1, but the
17 most representative of the lake would be at the
18 deepest location, which for reservoirs is typically
19 closest to the dam, so the Lake 1 would be my choice
20 of lacustrine sites for characterizing the lake at 03:44:32
21 large. But Lake 2 is another lacustrine site that's
22 further upstream within the lake.

23 Q Okay. So do you have an opinion whether total
24 phosphorus concentrations are better or worse than
25 they were historically at Lake sites 3 and 4? 03:45:12

1 MR. BOND: Object to the form.

2 A No. Again, I saw them, they're all in the

3 Cooke and Welch report, I saw them. I don't

4 remember exactly what they were. The ones that I

5 pulled out to focus on for my analyses were only the 03:45:20

6 Lake 1 sites.

7 Q (By Ms. Burch) Do you have a citation to any

8 reference for the EPA position that the best sites

9 for characterizing lacustrine zones are sites

10 nearest the dam? 03:45:28

11 A No. What I have is that EPA selects lake

12 sampling sites as the deepest part of the lake. Dr.

13 Conley presents -- I believe he presents a

14 bathymetric map, I'm fairly sure he does, and I

15 think Cooke and Welch might present a bathymetric 03:46:07

16 map, as well. Bathymetric maps shows you the

17 variation in depth in the different parts of the

18 lake. So my opinion is is that the deepest part of

19 Lake Tenkiller is the part at Lake 1. That's

20 normally where it is in a reservoir, close to the 03:46:17

21 dam, and I'm fairly confident that the data

22 presented, the bathymetric data presented by Conley

23 and/or Cooke and Welch substantiate that. So if you

24 want to verify that, you need to go to one of those

25 reports. I'm fairly confident that they do. But 03:46:25

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1 beyond what's in those reports, the general feeling
2 on reservoirs is the deepest part is closest to the
3 dam. That would not be something that I could
4 necessarily derive from EPA because when EPA
5 samples, they're sample lakes that include 03:47:03
6 reservoirs. Reservoirs is a type of lake. Some
7 people say lakes and reservoirs, but reservoirs are
8 a hydrological type of lake. And when EPA samples
9 lakes of all types, their sampling scheme for these
10 sites that they use to characterize the lake would 03:47:11
11 be the deepest points. Sometimes there are studies
12 that include some sampling at other locations, as
13 well, from the littoral zones, to get at biological
14 components, littoral samples, but the site that they
15 use to characterize a lake across the board with 03:47:19
16 their surveys is a site at the deepest part of the
17 lake.

18 Q Is that true with regard to -- without regard
19 to the purpose of the sampling?

20 A Well, these are -- EPA does a lot of large 03:47:25
21 statistical surveys. That's where they select their
22 sites as random and they sample them once, and then
23 they use that to characterize the resource across
24 the region, across the state, across the nation.
25 They are statistically based so results can be 03:48:04

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1 extrapolated from the individual lakes to larger
2 areas, be a region or a state or nation. Depending
3 on the statistical foundation of the survey, they'll
4 have the ability to extrapolate to different levels
5 of geography. That's what they do. They've done a 03:48:12
6 lot of those. Again, the most recent one was
7 conducted in 2007. The database just got finalized
8 a few weeks ago. I'll be working with those data
9 doing some analyses in the near future, and that
10 will be coming out in a report in various 03:48:22
11 publications over the next several years.

12 Q So I guess -- I understand what you're saying
13 in the context of surveys. In site specific studies
14 of lakes evaluating eutrophication, is it EPA's
15 practice to only look at one sampling site in the 03:49:04
16 deepest part of a lake or reservoir?

17 A My suspicion is you're probably going to see
18 the whole gamut from studies that sample at lots of
19 sites to studies that sample at one site. I mean,
20 beyond -- I can't tell you for sure, but that's my 03:49:12
21 suspicion.

22 Q Do you know how many sampling sites there were
23 in the EPA Clean Lake Study of Lake Tenkiller?

24 A I know there were multiple sites. I don't
25 remember how many there were. 03:49:19

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1 Q Did you -- in discussing any improvement in
2 the quality of Lake Tenkiller, did you do any
3 analysis of AHODS?

4 A Analysis of what?

5 Q AHODS. 03:49:32

6 A What's that?

7 Q That's okay, I guess you didn't.

8 A I have no idea what you said. Is that a crow
9 hoglet, with some kind of an accent from Oklahoma.

10 Q It's a Missouri accent. A-H-O-D-S? 03:50:07

11 A Okay. I've seen reference to that in other
12 reports. It's not something I know anything about.

13 Q Did you do any analysis in determining whether
14 or not Lake Tenkiller had improved or not improved
15 of chlorophyll a values? 03:50:16

16 A No, I did not.

17 Q Any other parameters besides total phosphorus?

18 A No.

19 Q Do you know whether Dr. Stevenson in his work
20 in the Illinois River looked at any parameters other 03:50:26
21 than total phosphorus when evaluating the impact,
22 eutrophication impacts in the Illinois River
23 watershed?

24 A Dr. Stevenson looked at a number of
25 parameters. The focus of my report is primarily on 03:51:06

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1 2005, '6 and '7.

2 Q Just so I understand what your basis was, one
3 was a statement you say Dr. Welch made in his
4 deposition?

5 A Yes. 03:55:04

6 Q And, again, what was the other basis?

7 A The lines, I think they were dotted lines on
8 the Cooke and Welch figure that this came from,
9 which Figure 7 or 8 rings a bell. In their report,
10 they put lines across the page at the -- borderlines 03:55:11
11 between oligotrophic, mesotrophic and eutrophic, so
12 that was their determ -- and where those lines are
13 is -- there are different opinions on where those
14 lines should be. Dr. Conley addresses that, I
15 believe, in his report. I'm not going to try to 03:55:20
16 tell you where they should be, but based on Cooke
17 and Welch's position of where they were, it puts
18 Lake 1 in the mesotrophic class for those three
19 years.

20 Q And just so I'm clear, are you talking about 03:55:27
21 at all lake stations or at Lake 1?

22 A I'm talking about Lake 1 that's on this graph.

23 Q I see. Do you have any opinion as to the
24 trophic status of Lake Tenkiller in the areas
25 represented by lake stations 2, 3 or 4? 03:56:07

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1 A No, but that information would be on that same
2 graphic in the Cooke and Welch report that I'm
3 referring to, and that information would probably be
4 in Conley's report because I believe he took
5 exception to some of the places where they put their 03:56:17
6 boundaries, but I don't remember exactly what Conley
7 had to say about that so, but I think -- and Horne
8 may have some discussion about it as well, so those
9 would be the three places to look, Horne, Conley and
10 Cooke and Welch. 03:56:24

11 Q Did you evaluate any of the total phosphorus
12 data collected at Lake 1 in 2008?

13 A No. I think that those data were probably
14 sent to me. I drew a line in the sand that if I was
15 going to get this thing done, I was not going to 03:57:04
16 look at any more new data, but I think that I did
17 receive some. I may have even received very
18 recently, but I have not looked at them and not
19 tried to consider any brand new data.

20 Q Did you look at the analysis, the PCR analysis 03:57:14
21 that Dr. Harwood did in this case?

22 A Yes.

23 Q Did you set forth some criticism of that
24 methodology in your report?

25 A I wouldn't characterize it as criticizing her 03:57:28